



Examining the Attitude-Behavior Gap and Adoption Intention of SHS Technology: The Role of Social Influence

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ABSTRACT

Current fuel-based electricity used to fulfill household electricity needs is one of the reasons that worsen global warming. Therefore, the use of solar energy starts to be favorable. Indonesia is benefited from abundant solar radiation levels, yet the utilization of solar energy as one possible solution is still very limited. The non-optimal use of this eco-friendly energy needs to be investigated by examining consumers' intention to adopt Solar House System (SHS) technology along with factors affecting it. This study used Behavioral Reasoning Theory (BRT) that consists of values, reasons for adoption, reasons against adoption, attitude, and social influence as variables to predict adoption intention. Further, Partial Least Square Modeling was used to test the hypotheses after collecting 428 data by distributing questionnaires in Bandung Area. The result reveals that social influence plays the most significant role in predicting SHS adoption intention, attitude, reasons for adoption, and values. Thus, this study extends our understanding of the attitude-behavior gap in the context of green technology and the impact of social influence.

KEYWORDS

Behavioral Reasoning Theory
Adoption Intention
Attitude-Behavior Gap
Social Influence
Renewable Energy

INTRODUCTION

At present, the world is facing an extreme environmental change, called as global warming. Worldwide temperature alteration has become a detrimental issue, one of which is brought by the increased emissions of greenhouse gases, particularly carbon emissions (CO₂) (Pachauri et al., 2014). These greenhouse gas emissions are set off by the utilization of non-renewable energy sources, such as petroleum that functions to generate electricity. Notwithstanding its contribution to worsening global warming, the counted number of petroleum derivative assets additionally fortifies the motivation behind why alternative energy that can supplant its job must be created. In fact, solar energy is professed to be safe, boundless, and non-polluting (Bachtiar, 2006). This is the thing that lies behind the advancement of different usage of solar-based fuel sources, for example, the solar house system (SHS). In addition to expanding admittance to power and protecting the climate, SHS

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is also embraced because it is practically liberated from maintenance costs, simpler to work, and more secure than other fuel sources (Akhmad, 2005; Feron, 2016). Therefore, from this account, it is essential to investigate the community's intention to adopt SHS technology.

Numerous written works have explored consumer intention on technology adoption (Chen, 2014; Claudy, Garcia, & O'Driscoll, 2015; Claudy, Peterson, & O'Driscoll, 2013; Wolske, Stern, & Dietz, 2017). These examinations with regards to sustainable power sources generally apply conventional speculations, for example, the theory of reasoned action (Fishbein & Ajzen, 1975) or technology acceptance model (Davis, 1989)— which have been impressively censured for their failures to answer attitude-behavior gap (Westaby, 2005). Thus, current researchers in the same study develop the behavioral reasoning theory (BRT), which gives insights in disclosing the process of consumer's thought to receive or to oppose innovation (Claudy et al., 2015; Claudy et al., 2013; Westaby, 2005). Previous literary works recognize personal factors and contextual influences (known as external conditions like social influences, institutional constraints, or regulatory incentives) that occur under the assumption in which contextual influences cannot be changed and personal factors may be the main factors that influence behavior (Claudy et al., 2013).

However, another study by Westaby estimates that global motives independently influence people's global perceived from social pressure behavior (Westaby, 2005). The reason which deciphers the significance of social influence in inclining people to define the information which later turns into their personal values, beliefs, and habits is the missing component that should be researched in innovating adoption study. Besides, extant studies have discovered proof that social influences have a huge function in forming the perceived usefulness of technology and people's behavioral intention to adopt the technology. Particularly in Indonesia with its collectivist culture, people favor homogeneity and similarity, in which something that is not gone along will be viewed as the inability to bond with the group. The collectivist spirit allows individuals to suggest their own personal values that still be dependent on social norms. Based upon this idea, this study proposes that investigating the function of social influence to serve an improved BRT as a valuable theoretical framework to better comprehend the psychological preparation of innovation adoption and resistance in Indonesia is essential.

MODEL AND RESEARCH HYPOTHESES

Development of the research model

In marketing science, understanding consumer attitude and behavioral intention to innovation has so far become a top research need. The theories usually used to quantify these variables are the theory of planned behavior and the theory of reasoned action. Nonetheless, traditional behavioral intention models have failed to understand the attitude-behavior gap (Fishbein & Ajzen, 1975; Peattie, 2010; Westaby, Probst, & Lee, 2010). In the context of renewable energy, for example, consumers are showing an accepting perspective but the adoption behavior experiences frail dispersion in numerous nations (Claudy, Michelsen, & O'Driscoll, 2011).

A recent model which is an augmentation of TPB, the behavioral reasoning theory, proposes a potential detail for the attitude-behavior gap by including context-specific reasons (Westaby, 2005). This framework adequately accounts for the effect of reasons and separates between the factors for and against consumers' behavior in adoption decisions (Westaby, 2005). Moreover, renewable energy, particularly the solar house system technology, is a high-inclusion item that requires a discerning assessment of the reasons for and against the adoption decision process (Claudy et al.,

2013). Consequently, by applying the behavioral reasoning theory, this study is expected to improve the comprehension of attitude and intention formation in the context of solar house system technology.

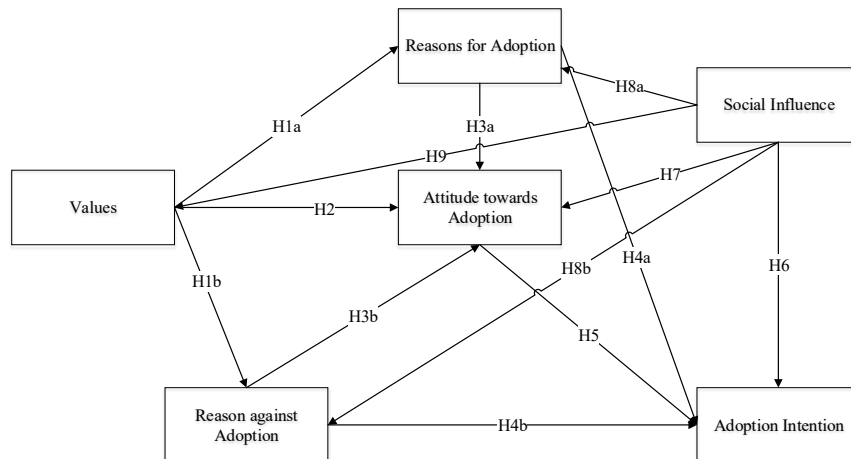


Figure 1. Proposed model

Value

Values are motivational constructs, which allude to alluring objectives that people endeavor to achieve (Schwartz, 2005). Numerous literary works assume that reasoning does not happen autonomously but is influenced by consumer's profound established values (Claudy et al., 2013; Westaby, 2005). Reasoning happens when consumers actuate cognitive processes to develop their beliefs and values. Further, this value information process directly affects the reasons that customers use to legitimize their anticipated behavior (Claudy et al., 2013; Westaby, 2005). Many studies affirm that when consumers see a product is in accordance with their own values, they tend to embrace and accept it (Garcia, Bardhi, & Friedrich, 2007; Kleijnen, Lee, & Wetzels, 2009).

H_{1a}: Consumers' values will positively influence the reasons for adoption

H_{1b}: Consumers' values will negatively influence the reasons against adoption

Furthermore, values can immediately affect consumers' attitudes since reasons may not be completely activated in certain conditions (Tversky & Kahneman, 1974). This happens when consumers want to be more heuristic or to be simpler in responding to the information process without completely assessing the advantages and dangers in decision making (Tversky & Kahneman, 1974; Westaby, 2005), which means consumers structure an attitude without objectively advocating their anticipated behavior.

H₂: Consumers' values will positively influence attitudes towards adoption

Reasoning

The reasoning concept is different from beliefs and values. Beliefs are consumers' emotional likelihood that could bring an expansive range of future results and may not be unavoidably connected to the final decision (Claudy et al., 2013). Meanwhile, reasons are context-specific

comprehensions that are connected to behavioral explanation. Reasons allude to a thin center that particular variables are important for consumers' behavioral set and influence the purchase decision (Claudy et al., 2015; Westaby, 2005). For example, consumers may firmly accept that utilizing an eco-accommodating product would assist them in preserving the environment. Nonetheless, they may choose not to adopt the product due to the lack of funds. Thus, the following hypotheses are formed:

H_{3a}: Consumers' reasons for adoption will positively influence their attitudes towards adoption

H_{3b}: Consumers' reasons against adoption will negatively influence their attitudes towards adoption

However, reasons may legitimately impact behavioral intention without relying upon the complete process of global motives (experiencing the way toward framing perspectives). Reasons in BRT characterize past intentions that are clarified by global motives alone (Gupta & Arora, 2017). Also, the traditional models have been impressively censured for their inability to explain customer resistance from innovations (Garcia et al., 2007; Ram & Sheth, 1989). It shows that context-specific legitimations have an essential part in forming intentions. In this manner, the following hypotheses are proposed:

H_{4a}: Consumers' reasons for adoption will directly and positively influence adoption intentions

H_{4b}: Consumers' reasons against adoption will directly and negatively influence adoption intentions

Attitude

The behavioral reasoning theory sets that the key determinant of consumer's adoption intention is attitude. Attitude is a mental inclination with some level of favor or disfavor which influences behaviors (Westaby, 2005). Numerous studies with regards to environmentally friendly power energy conducted in Australia and the US have affirmed the positive relationship between attitude and adoption intention (Paladino & Baggiere, 2007; Wiser, 2007). It shows that consumers' likelihood to shape an intention to lastly adopt a renewable energy technology is reflected in their attitude towards technology.

H₅: Consumers' attitudes will positively influence adoption intentions

Social influence

The behavioral reasoning theory also propounds social influence (subjective norm) factor as global motives along with attitude and perceived control as the primary antecedents of intention (Westaby, 2005). In spite of the fact that this variable has various names (subjective norm in TRA, TPB, TAM2; social factors in MPCU; and image in IDT), each construct contains the idea that someone's behavior is influenced by his perception that many important people to him or a particular social circumstance urge him to perform certain behavior (Venkatesh, Morris, Davis, & Davis, 2003). The relationship between social influence and behavioral intention has been tested by many studies and the results are proven in the context of energy-efficient products (Ha & Janda, 2012). Therefore, the following hypothesis is proposed:

H₆: Social influence will positively influence the adoption intention

Attitude concerns with an individual's belief with respect to the results of undertaking a particular behavior as a component of the individual's valuation of the outcomes. Besides being created by behavioral beliefs (Ajzen, 2002), social pressure may likewise impact people to have a positive or negative attitude towards environmental protection. This thought is in accordance with the result of a study conducted in the UK about green electricity adoption (Ozaki, 2011). Along these lines, the hypothesis proposed is:

H₇: Social influence will positively influence consumer's attitudes towards adoption

Literary works assume that pro-environmental values presumably come first before pro-environmental behavior (Pickett-Baker & Ozaki, 2008). For example, to create environmental solutions, people accept that generous exertion is required to lower the usage of energy and preserve the environment (Niemeyer, 2010). Be that as it may, studies find a 'value-action gap' since people decipher and react to similar environmental information in unpredictable and various manners (Blake, 1999; Gadenne, Sharma, Kerr, & Smith, 2011). For this situation, it is inevitable that others' understanding and assessment may likewise impact a person in characterizing the information which later turns into his own values.

Hereinafter, it is normal that reasoning is affected by values (Claudy et al., 2013). Appropriately, it is additionally sensible that social influence directly affects reasoning without experiencing the values. Consumers could get any information about the environment from individuals around them and actuate their cognitive processes to make reasoning (Westaby, 2005). Consequently, the following hypotheses are proposed:

H_{8a}: Social influence will positively influence the reasons for adoption

H_{8b}: Social influence will negatively influence the reasons against adoption

H₉: Social influence will positively influence consumers' values

RESEARCH METHOD

The design of this study is causal to comprehend the relationship between variables (Suhartanto, 2014). The information gathered is the primary data with the sample of n = 428 from the greater city of Bandung. The respondents were examined concerning their intention to adopt solar house system technology. 202 out of 428 respondents are male (47.2%) while the other 226 are female (52.8%). In terms of age, the respondents were relatively diverse, with ages 18-25 being 188 (43.9%), 26-33 being 62 (14.5%), 34-41 being 60 (14%), 42-49 being 65 (15.2%), and 50-57 being 53 (12.4%).

The SHS adoption intention variables were measured by using a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). Also, partial least squares structural equation modeling (PLS-SEM) was used to verify the structural model and to test the proposed hypotheses (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). The model testing included the evaluation of internal consistency as well as convergent and divergent validity of the instrument. To indicate that the construct determines values of the measured and the representative of indicator variables, composite reliability, average variance extracted (AVE), and correlations among latent constructs were also tested.

RESULTS

The assessment of PLS-SEM can be conducted through two methodologies, which are the assessment of the model measurements and the evaluation of the structural model. The assessment of the model measurements should be possible by analyzing the reliability and validity of the construct. To affirm the reliability, the standardized indicator loadings must be 0.7, yet greater than 0.4 can still be accepted (Hair, Sarstedt, Ringle, & Mena, 2012). Further, the value of composite reliability (CR) must be greater than 0.7 to ascertain internal consistency reliability. Meanwhile, the assessment of validity encompasses the evaluation of convergent validity and discriminant validity. Convergent validity can be measured through the average variance extracted (AVE) value that must be greater than 0.5 (Hair et al., 2016). Based on these criteria, Table 1 shows that this study has fulfilled the requirements related to model measurement evaluation.

Table 1. Loading, Composite Reliability, and AVE

Construct/item (mean; standard deviation)	Loading*	CR	AVE
Value		0.920	0.793
- In line with my personal values.	0.896		
- In accordance with the way I see the world.	0.888		
- Consistent with the way I live my life.	0.887		
Reasons for Adoption		0.890	0.505
Financial Benefit:			
- Significantly reduce monthly electricity bills.	0.657		
- Allow me to spend more money on other things in life.	0.592		
- Return capital and make a profit.	0.696		
Environmental-Independence Benefit:			
- Help me to reduce the use of fossil fuels and emissions.	0.763		
- Help improve my local environment.	0.771		
- Make me independent of the national electricity provider.	0.714		
- Make me self-sufficient in my own electricity needs.	0.732		
- Reduce my dependence on oil or natural gas.	0.746		
- Reasons against Adoption		0.855	0.597
Cost Barrier:			
- The initial installation fee will be too high for me.	0.695		
Risk Barrier:			
- I'm worried about how much maintenance costs will be needed.	0.733		
Incompatibility Barrier:			
- Requires a large additional effort.	0.849		
- Must do some home renovations seriously.	0.804		
Attitude		0.893	0.675
- Is a good thing.	0.810		
- Would be a pleasure.	0.786		
- Would be useful.	0.851		
- Will add a lot of value.	0.838		
Social Influence		0.918	0.788
- People who influence my behavior think I should use PS.	0.895		
- People who are important to me think I have to use PS.	0.870		
- People who influence my behavior think PS will benefit me.	0.898		
Adoption Intention		0.821	0.607
- I intend to use SHS if access is available.	0.848		
- I intend to use SHS when my financial condition is possible.	0.793		
- I intend to use SHS regularly.	0.687		

Note: *) significant at $p < 0.01$

Based on the calculation of the path coefficient in Table 2, it shows that the value on reasons for adoption ($\beta = 0.461$) and the value on attitude ($\beta = 0.223$) are significant; thus, H_{1a} and H_2 are accepted. Conversely, the value on reasons against adoption ($\beta = -0.040$) is not significant, so H_{1b} is rejected. Further, the reasons for adoption ($\beta = 0.361$) and the reasons against adoption ($\beta = -0.123$) on attitude, as well as the reasons for adoption ($\beta = 0.171$) and the reasons against adoption ($\beta = -0.107$) on adoption intention are significant; thus, H_{3a} – H_{4b} are supported. H_5 is also accepted, seen from the coefficient value of attitude on intention ($\beta = 0.245$) which is significant. Moreover, social influence on intention ($\beta = 0.359$), social influence on attitude ($\beta = 0.225$), social influence on reasons for adoption ($\beta = 0.175$), and social influence on value ($\beta = 0.433$) indicate that H_6 , H_7 , H_{8a} , H_9 are accepted. On the contrary, H_{8b} is rejected because social influence on reasons against adoption ($\beta = -0.041$) is found not significant.

Table 2. Hypotheses Testing

	Path	Coefficient (β)	t-value	Test Result
H_{1a}	Value \rightarrow Reasons for Adoption	0.461	9.533*	Accepted
H_{1b}	Value \rightarrow Reasons against Adoption	0.040	0.613	Rejected
H_2	Value \rightarrow Attitude	0.223	4.446*	Accepted
H_{3a}	Reasons for Adoption \rightarrow Attitude	0.361	7.336*	Accepted
H_{3b}	Reasons against Adoption \rightarrow Attitude	-0.123	3.138*	Accepted
H_{4a}	Reasons for Adoption \rightarrow Adoption Intention	0.171	3.217*	Accepted
H_{4b}	Reasons against Adoption \rightarrow Adoption Intention	-0.107	2.651*	Accepted
H_5	Attitude \rightarrow Adoption Intention	0.245	4.675*	Accepted
H_6	Social Influence \rightarrow Adoption Intention	0.359	7.605*	Accepted
H_7	Social Influence \rightarrow Attitude	0.225	5.289*	Accepted
H_{8a}	Social Influence \rightarrow Reasons for Adoption	0.175	3.608*	Accepted
H_{8b}	Social Influence \rightarrow Reasons against Adoption	-0.041	0.736	Rejected
H_9	Social Influence \rightarrow Value	0.433	10.313*	Accepted

Note: *) significant at $p < 0.05$

DISCUSSION

The results of this research uncover that value has a positive and significant influence on the reasons for adoption (H_{1a}). This supports the previous studies that value plays a significant part as an antecedent to frame reasoning and attitude (Karahanna, Agarwal, & Angst, 2006). Moreover, value is confirmed to have a positive and significant influence on attitude towards adoption (H_2). This happens on the grounds that consumers may want to over-simplify their information processing, known as heuristic motives. Value, additionally, influences attitude via reasoning, which demonstrates a more profound degree of effect attitude via reasoning (Westaby, 2005). Nonetheless, in this study, value does not impact the reasons against adoption (H_{1b}). This happens on the grounds that the reasons for and against adoption are not opposing, but they are different constructs that influence consumers' adoption in different manners (Claudy et al., 2015). In this finding, consumers activate cognitive processing to develop their own personal values to frame their reasoning for adoption. When they see that SHS is as per their values, it reinforces the explanation behind them to adopt it. The values they believe, in any case, do not influence impediments or obstructions they face to adopt the technology.

Furthermore, this research centers on the reasonings (for and against) that have been infrequently tried in empirical studies about the adoption of innovation. The findings report that the reasons for and against adoption significantly influence attitude (H_{3a} ; H_{3b}) and adoption intention (H_{4a} ; H_{4b}). As discussed earlier, reasoning turns into the solid legitimization component to help the agreeableness of their anticipated behavior or decision. Reasons may likewise straightforwardly influence adoption intention without relying on the whole process of decision making (Westaby, 2005). This clarifies why, sometimes, customers have a positive attitude, but they might still decide against adoption because of a crucial reason like an incompatibility barrier.

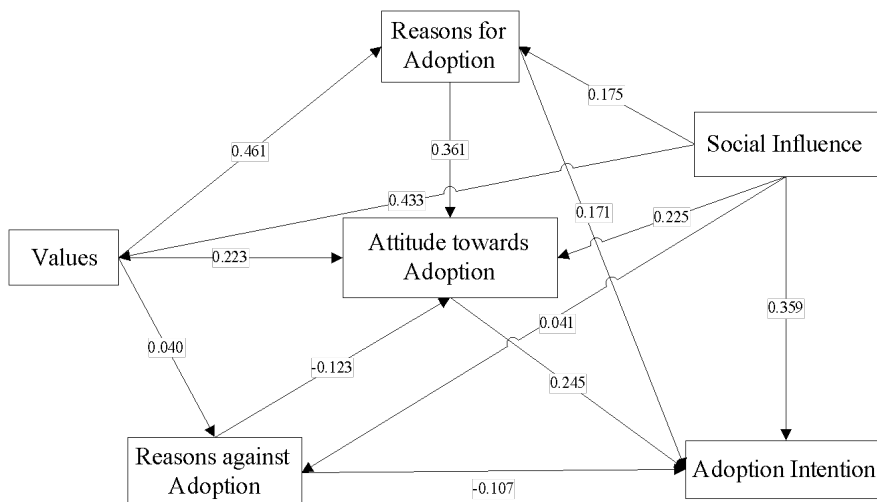


Figure 2. Summarized result

Consequently, the findings of this study determine past research proposing that attitude affects adoption intention (H_5). It explains the thought that the higher the customer's attitude towards adoption, the higher their chance of forming an intention to finally adopt it. Research in Swedish households affirms that positive attitudes are the principal indicator of purchasing green electricity (Hansla, Gamble, Juliusson, & Gärling, 2008).

This study additionally underscores the crucial part of social influence in affecting adoption intention (H_6). The outcome implies that somebody's intention to adapt SHS technology might be molded by the amount of others' environmental endeavors that she sees and she clings to, that trigger her to also contribute to preserving their environment. Additionally, this finding is in accordance with a study in German which affirms that norm is a huge determinant of someone's ability to take an interest in community energy (Kalkbrenner & Roosen, 2016). Thus, consumers can refer others to encourage them in adopting SHS technology.

Moreover, social influence is demonstrated to be noteworthy on consumers in shaping a positive or negative attitude towards SHS adoption (H_7). This finding is in line with the study of consumer environmental behavior in Australia (Gadenne et al., 2011). Other than that, social influence additionally affects consumers' values and their reason for adoption (H_{8a} ; H_9). The study finds out that others' assessments can supplement the different individual perceptions and values regarding SHS reception (Gadenne et al., 2011). Social pressure can also influence one's reasoning to adopt SHS technology. Conversely, social influence is discovered to be inconsequential to the reasons against adoption (H_{8b}). This case is comparative with values influencing reasoning, which happens since the

reasons for and reasons against adoption are built to be opposing with each other. Along these lines, social pressure does not influence their obstructions to not adopt the technology.

MANAGER IMPLICATION

Despite the fact that SHS is demonstrated to be environmentally and economically productive since the asset resolved-solar in Indonesia is plentiful, the use of solar energy is still limited. This gap between positive attitude and reluctance to adopt already has not been surely known, but whenever left examined, will keep on hampering the dispersion of sustainable power sources in the market (Prothero & Fitchett, 2000). This research results that attitude, reasons for adoption, and reasons against adoption affect SHS adoption intention. All things considered, this study finds that social influence has a part in affecting the adoption intention and the forming factors, including reasoning. It is recommended that business designers or solar panel companies to maximize the social influence factor in their business activities.

Solar panel companies and business engineers ought to underscore the social influence in their web-based media, which is at present the most advantageous promotional media. Other than giving information about the advantages and features of the product, sharing the testimonials is also a beneficial strategy. Featuring the customer testimonials in social media posts permits different customers to see the advantages of SHS. Besides, SHS technology is a people's high-inclusion product, which is a great idea to allude to different consumers who have utilized it as a wellspring of product assessment. Through this, it is expected that consumers can build more reasons to adopt the technology.

In addition, other than focusing on the product, sharing the campaign to use solar energy is also an important social mission to educate people regarding the environment. This will embrace the personal values and shape an advanced personal awareness regarding environmental conservation, which in the end, frames consumers' positive attitude toward SHS adoption. This strategy is in line with the research findings that personal values, reasons for adoption, attitude, and adoption intention will be affected by social influence.

LIMITATION AND FUTURE RESEARCH

This study just centered around the society who lives in the greater city of Bandung which suggests that this investigation could not speak for the entire Indonesian society. Future studies may test the comparable model in terms of renewable energy in different regions for more improved discoveries. Moreover, quantitative data is the main information utilized in this research. Thus, qualitative data obtained from interviews and focus group discussion is essential in deciding the stronger builds and more composed results. Last, future research with different samples is needed to expand this study and imperative implications

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